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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,237	01/11/2002	Michael Seibert	12742-US	4832

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EXAMINER
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SINGH, RAMNANDAN P

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 10/06/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/042,237

Applicant(s)

SEIBERT, MICHAEL

Examiner

Dr. Ramnandan Singh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 January 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 8-11, 13-18, 20-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 5-7, 12 and 19 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Election/Restrictions***

**ELECTION OF SPECIES**

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

**GROUP-I**

Species I: Claims 3 and 17 are directed to a determinant of the matrix.

Species II: Claims 5 and 19 are directed to an eigen-decomposition of the matrix.

Species III: Claim 6 is directed to a single-valued decompositions (SVD) of the matrix.

Species IV: Claim 7 is directed to condition numbers of the matrix.

**GROUP-II:**

Species I: Claim 11 is directed to the time-domain elements of the matrix.

Species II: Claims 12 is directed to the frequency-domain elements of the matrix.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species from Group-I and Group-II for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic claim.

2. During the telephone conversation with Richard Mitchell, Attorney for the Applicant, on 26 September 2003, the Examiner informed about the election/restriction requirement. On 29 September 2003, the Applicant made a provisional election of invention defined by Claims 3 and 17 from Group-I along with Claim 11 from Group-II for prosecution on merit without traverse. Affirmation of this election must be made by the Applicant in replying to this Office action. Claims 5, 6, 7, 12 and 19 are withdrawn from further consideration by the Examiner, 37 CFR 1.142(b), as being directed to a non-elected invention.

### *Drawings*

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Claim 1 recites a limitation **"generating a correlation-based matrix of signals"** on page 4 line 4. Also, it recites a limitation **"correlation-based matrix to identify double-talk and path changes"** on page 13, line 6. The "correlation matrix" and "double-talk detector" are not shown. A similar thing holds for Claim 15. Further, Claim 4 recites a limitation, "when the value of the determinant **passes predetermined threshold values**" on page 13, line 13. A comparator for using a threshold is not shown. A similar thing holds for Claim 18. Claim 14 recites two variables  **$S_0[n]$  and  $S_1[n]$** ; these variables are not shown. A similar thing holds for Claims 13 and 22.

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Therefore, these features must be shown or the feature(s) canceled from the claim(s).

No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Further, since Fig. 1 is prior art, it may be labeled as "Prior Art".

### ***Claim Objections***

4. Claim 18 is objected to because of the following informalities: Claim 18 recites "as claimed in Claim 16" on page 14, line 19. The term "**Claim 16**" be corrected to "**Claim 17**".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4, 8-11, 13-18, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding [US 6,226,380 B1] in view of Benesty et al [IEEE Trans. on Speech and Audio Processing; Vol. 8, No. 2, March 2000; pp. 168-172]

Regarding Claim 1, Ding teaches cross-correlation methods for detecting double-talk and path changes in an echo cancellation system shown in Figs. 1-2 [col. 2, lines 48-52], the cross-correlation methods generate vectors of an output signal and an echo estimate [col. 2, lines 33-46], and determine by comparing the absolute value of cross-correlation between the output signal and the echo estimate signal [col. 3, lines 5-40; col. 5, lines 14-29; col. 6, line 66 to col. 7, line 25]. It may be noted that, although Ding teaches cross-correlation methods for detecting double-talk and path changes using a scalar and a vector, the methods can easily be generalized using scalars to a Vector, and vectors to a matrix which is well-known in the art.

Dig does not teach expressly using a cross-correlation matrix for detecting double talk and path changes.

Benesty et al teaches applying cross-correlation methods, first using two scalars  $x$  and  $y$ ; next using two vectors  $X$  and  $Y$  [Section III] wherein a normalized cross-correlation matrix  $C_{xy}$  between two vectors  $X$  and  $Y$  is given in Equation (13) [pages 169-170].

Ding and Benesty et al are analogous art because they are from a similar problem solving area, viz. , detecting double talk in echo cancellation systems.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the cross-correlation matrix of Benesty et al with the Ding system as a generalized cross-correlation method.

The suggestion/motivation for doing so would have been to improve the performance of an echo canceller to detect double talk under echo path changes [Benesty et al; page. 169; col. 1, 3-7; page 171, Fig. 2].

Claim 15 is essentially similar to Claim 1 and is rejected for the reasons stated above apropos of Claim 1.

Regarding Claim 2, Benesty et al discloses zero-lag auto and cross-correlations,  $R_{xx}$  and  $R_{xy}$  [Equation 13; Section IV, Page 170].

Claim 16 is essentially similar to Claim 2 and is rejected for the reasons stated above apropos of Claim 2.

Regarding Claim 3, the combination of Ding and Benesty et al teaches a determinant of the cross-correlation matrix to detect double talk and path changes [Benesty et al; Equation 14].

Claim 17 is essentially similar to Claim 3 and is rejected for the reasons stated above apropos of Claim 3.

Regarding Claim 4, the combination of Ding and Benesty et al teaches applying a predetermined threshold for detection [Benesty et al; p. 171].

Claim 18 is essentially similar to Claim 4 and is rejected for the reasons stated above apropos of Claim 4.

Regarding Claims 8 and 20, see Fig. 1 of Ding.

Regarding Claims 9 and 10, the combination of Ding and Benesty et al teaches an adaptive filter wherein an adaptive algorithm such as NLMS (Normalized Least Mean Square) is applied [Ding; Fig. 1; col. 2, lines 18-33].

Claim 21 is essentially similar to Claim 9 and is rejected for the reasons stated above apropos of Claim 9.

Regarding Claims 11 and 13, the combination of Ding and Benesty et al teaches a normalized cross-correlation matrix  $C_{xy}$  between two vectors X and Y in the time domain, wherein the X and Y are statistical variables [Benesty et al: Page 169, Equations (13-14); Section IV].



Claim 22 is essentially similar to Claim 13 and is rejected for the reasons stated above apropos of Claim 13.

Regarding Claim 14 , see Fig. 1 of Ding.

**Conclusion**

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(i) Cho et al ; "An Objective Technique for Evaluating Doubletalk Detectors in Acoustic Echo Cancelers", IEEE Trans. on Speech and Audio Processing, Vol. 7, No. 6, November 1999; pp. 718-724 , ALL;

(ii) Asharif et al, "Correlation LMS Algorithm and its application to Doubletalk echo canceling", Electronic Letters; 4<sup>th</sup> February 1999, Vol. 35, No. 3; pp. 194-195, ALL;

(iii) Knapp et al , "The Generalized Correlation Method for Estimation of Time Delay", 1976, IEEE Trans. on Acoustics, Speech, and Signal Processing, Vol. ASSP-24, No. 4, August 1976; pp. 320-327, and

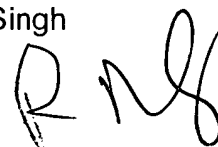
(iv) Okuno et al [US 5,987,143] teaches a correlation function of two vectors [col. 2, lines 29-58; col. 4, line 22 to col. 5, line 35; col. 7, lines 32-52; col. 8, lines 11-67]

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Ramnandan Singh whose telephone number is (703)308-6270. The examiner can normally be reached on M-F(8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester Isen can be reached on (703)-305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)306-0377.

Dr. Ramnandan Singh  
Examiner  
Art Unit 2644

A handwritten signature in black ink, appearing to be 'R Singh', is written to the right of the typed name.